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EXAMINER	
LEE, DAVID J	

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Please find below and/or attached an Office communication concerning this application or proceeding.

8T

Office Action Summary	Application No. 10/653,525	Applicant(s) ISLAM, MOHAMMED N.	
	Examiner David Lee	Art Unit 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,7-11,13,14,17,18,24,25,27,33-36,41,43 and 47-74* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,7-11,13,14,17,18,24,25,27,33-36,41,43 and 47-74* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 18, 24, 25, 27, 33-35, 56-66 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

Claim 18 recites the limitation, "a plurality of integrated modules operable to communicate a multiple wavelength output signal." The specification teaches that a plurality of integrated modules is operable to transmit a plurality of individual wavelength output signals, which are then multiplexed by a star coupler to form a multiple wavelength output signal. The limitation as claimed was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 7-11, 13, 14, 17, 35, 48-55, 66 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "at least one of the plurality of optical signals" in 4. There is insufficient antecedent basis for this limitation in the claim.

Claim 7 recites the limitation "a plurality of optical input wavelength signals." Claim 1 recites the limitation "an input optical signal." It is unclear whether "a plurality of optical input wavelength signals" of claim 7 is referring to "an input optical signal" of claim 1.

Claim 35 recites the limitation "to generate a multiple wavelength output optical signal." Independent claim 18, upon which claim 35 depends, recites the limitation "to generate at least one wavelength of a multiple wavelength output optical signal." It is unclear as to whether or not these limitations are referring to the same "multiple wavelength output optical signal" or different signals.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 36, 41, 43, 47, 68, 71, 74 are rejected under 35 U.S.C. 102(b) as being anticipated by Arthurs et al. (US Patent No. 5,005,167; hereinafter "Arthurs '167").

Regarding claim 36, Arthurs '167 teaches an optical communication system, comprising: a first integrated module (12-1 and 22-1 of fig. 10) that generates a first output signal comprising a first optical signal wavelength (λ_1), the first integrated module coupled to an optical distribution network (20 of fig. 10) comprising one or more optical power splitters (star coupler 21 splits signal into 27-1 to 27-N; see also col. 4, lines 50-56), at least some of a first one or more of the optical power splitters receive the first output signal and separate the first output signal into a plurality of first output optical signals (see col. 4, lines 50-56: λ_1 of fig. 10 is split into a plurality of signals at λ_1), each of the plurality of first output optical signals comprising a substantially similar set of wavelengths (each signal along 27 is substantially similar – see col. 3, lines 50-56); a second integrated module (26-1 and 14-1 of fig. 10) that generates a second output signal comprising a second optical signal wavelength (along fiber 18-1 of fig. 10), the second integrated module coupled to the optical distribution network (coupled to network 20 of fig. 10) comprising the one or more optical power splitters (star coupler 21 splits signal into 27-1 to 27-N; see also col. 4, lines 50-56), wherein the second integrated module receives at least one of the plurality of first output optical signals (receives signals along fiber 27-1 of fig. 10) and wherein at least the second integrated module comprises: an optical signal separator (26 of fig. 9) operable to separate the first optical signal wavelength from one or more optical signal wavelengths received by the second integrated module (see fig. 9: separator 26 separates the desired input signal from multiple wavelength signal along 27); one or more receivers (144 of fig. 9) operable to receive the first optical signal wavelength and to convert at least a portion of the first optical signal wavelength into an electrical signal (144 converts from optical to electrical); and one or more transmitters each operable to generate the second output optical

signal at the second optical signal wavelength and to modulate information onto the second output optical signal (148 of fig. 9), wherein the first optical signal wavelength is different than the second optical signal wavelength (col. 4, lines 44-48: the first optical signal wavelength is a "unique transmitting wavelength", different than other wavelengths); and a controller coupled to the first and second integrated modules (10" of fig. 10), the controller operable to generate a control signal (via track 31 of fig. 9) based at least in part on a scheduling algorithm (see col. 5, lines 42-51) and to communicate the control signal to at least the first and second integrated modules (via track 31 of fig. 9), wherein the first and second integrated modules use the control signal to reduce contention within the optical communication system (see col. 5, lines 42-51; see also col. 10, lines 1-13).

Regarding claim 41, Arthurs '167 teaches that the first optical signal wavelength comprises a packet comprising an identifier associated with a destination element external to the optical communication system (see fig. 3).

Regarding claim 43, Arthurs '167 teaches that at least some of the one or more transmitters comprise one or more light source that are selected from the group consisting of laser diodes and light emitting diodes (148 of fig. 9).

Regarding claim 47, Arthurs '167 teaches a look up table operable to facilitate generation of at least a first control signal based at least in part on an identifier (fig. 6; see also col. 10, lines 3-27).

Regarding claim 68, Arthurs '167 teaches that the optical signal separator comprises a filter (26 of fig. 9), and wherein the filter separates the first optical signal wavelength from the

one or more optical signal wavelengths based at least in part on the control signal generated by the controller (control signal from track 31 of fig. 9).

Regarding claim 71, Arthurs '167 teaches a communication link comprising one or more single mode optical fibers (col. 2, line 50).

Regarding claim 74, Arthurs '167 teaches that the scheduling algorithm comprises a round robin scheduling algorithm (the scheduling algorithm 30 of fig. 10 is considered "round robin" in that it uses a token format traveling around the network; see also col. 5, line 43 to col. 6, line 7).

Claims 36 and 67 are rejected under 35 U.S.C. 102(b) as being anticipated by Arthurs et al. (US Patent No. 4,873,681; hereinafter "Arthurs '681").

Regarding claim 36, Arthurs '681 teaches an optical communication system, comprising: a first integrated module (45-N of fig. 1) that generates a first output signal comprising a first optical signal wavelength (transmitter 45-N of fig. 1), the first integrated module coupled to an optical distribution network comprising one or more optical power splitters (splitters in network 20 of fig. 1), at least some of a first one or more of the optical power splitters receive the first output signal and separate the first output signal into a plurality of first output optical signals (star coupler 22 splits signal along trunks 26-1 to 26-N of fig. 1), each of the plurality of first output optical signals comprising a substantially similar set of wavelengths (see col. 4, lines 13-15); a second integrated module (18-N of fig. 1) that generates a second output signal comprising a second optical signal wavelength (transmitter 67-N of fig. 1), the second integrated module coupled to the optical distribution network comprising the one or more optical power splitters

(coupled to network 20 of fig. 1), wherein the second integrated module receives at least one of the plurality of first output optical signals (via trunk 34-N) and wherein at least the second integrated module comprises: an optical signal separator operable to separate the first optical signal wavelength from one or more optical signal wavelengths received by the second integrated module (col. 5, lines 23-26); one or more receivers operable to receive the first optical signal wavelength and to convert at least a portion of the first optical signal wavelength into an electrical signal (receiver 61-N of fig. 1); and one or more transmitters each operable to generate the second output optical signal at the second optical signal wavelength and to modulate information onto the second output optical signal (transmitter 67-N of fig. 1), wherein the first optical signal wavelength is different than the second optical signal wavelength (second wavelength is unique – see col. 4, lines 55-60); and a controller coupled to the first and second integrated modules (40 of fig. 1; see also fig. 2), the controller operable to generate a control signal (47 of fig. 1) based at least in part on a scheduling algorithm (e.g., see figs. 5A and 5B) and to communicate the control signal to at least the first and second integrated modules (via fiber trunks), wherein the first and second integrated modules use the control signal to reduce contention within the optical communication system (see Abstract).

Regarding claim 67, Arthus '681 teaches that at least some of a second one or more optical power splitters (32 of fig. 1) receive the second output signal and separate the second output signal into a plurality of second output optical signals (via fiber trunks 36-N), each of the plurality of second output optical signals comprising a substantially similar set of wavelengths, and wherein the first integrated module receives at least one of the plurality of second output optical signals (51-N of fig. 1).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 69 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Okayama et al. (US Patent No. 5,636,045).

Regarding claims 69 and 70, Arthurs '167 teaches the limitations of claim 36, but does not expressly disclose that the output signals are time division multiplexed. However, time division multiplexing is well known in the art. For example, Okayama discloses a packet switching system wherein signals are time division multiplexed by a star coupler (col. 1, lines 31-34). It would have been obvious to a skilled artisan at the time of invention to time division multiplex the signals in order to efficiently utilize bandwidth.

Claims 72 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Labriola, II (US Patent No. 5,428,470).

Regarding claim 72, Arthurs '167 teaches the limitations of claim 36 including the limitation of a control network (30 of fig. 9). Arthurs '167 does not specifically disclose that the control network comprises an Ethernet network. However, Ethernet networks are well known in the art. For example, Labriola teaches a network system utilizing Ethernet links (col. 3, lines 44-47). One of ordinary skill in the art would have been motivated to use Ethernet links for

coupling in order to provide high speed and efficient operation. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use Ethernet in the control network of Arthurs '167.

Claim 73 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167.

Regarding claim 73, Arthurs '167 teaches the limitations of claim 36 but does not expressly disclose an optical amplifier to amplify the signal wavelengths. Examiner takes official notice that using an amplifier to amplify optical signals is well known in the art. It would have been obvious to a skilled artisan at the time of invention to include an optical amplifier in the system of Arthurs '167 in order to boost signal levels.

Claims 1, 7, 8, 11, 13, 14, 17, 49, 52, 53, 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Cheung et al. (US Patent No. 5,173,794).

Regarding claim 1, Arthurs '167 teaches an optical communication device, comprising: a plurality of integrated modules operable to transmit and receive a plurality of optical signal wavelengths (12-N and 22-N of fig. 10), at least one of the plurality of integrated modules comprising: one or more transmitters each operable to generate at least one of the plurality of optical signals (22-N of fig. 10) and to modulate information onto the at least one of the plurality of optical signals to form a modulated optical output signal (via 22 of fig. 8), each modulated optical output signal comprising a first optical signal wavelength (e.g., λ_1 of fig. 10); and one or more receivers each operable to receive an input optical signal (121 of fig. 8), each input optical signal comprising a second optical signal wavelength (along fiber 16 of fig. 8), wherein each first

optical signal wavelength is different than each second optical signal wavelength (see col. 4, lines 44-47: note that the first wavelengths λ_1-λ_N are "unique transmitting wavelengths", different than other wavelengths); a star coupler (20 of fig. 10) comprising an optical splitter (col. 4, lines 50-56), wherein the optical splitter comprises a power splitter that separates the multiple wavelength output optical signal (multiple wavelength signal λ_1-λ_N) into a plurality of multiple wavelength output optical signals (27-1 - 27-N of fig. 10), each of the plurality of output optical signals comprising a substantially similar set of wavelengths (col. 4, lines 50-56); and a controller coupled to at least some of the plurality of integrated modules (10" of fig. 10), the controller operable to generate a control signal (31, 131 of fig. 8) based at least in part on a scheduling algorithm (see col. 5, lines 42-51) and to communicate the control signal to the at least some of the plurality of integrated modules (transmission control 130, token buffer 124 of fig. 8), wherein the at least some of the plurality of integrated modules use the control signal to reduce contention between the plurality of integrated modules (see col. 5, lines 42-51; see also col. 10, lines 1-13). As stated above, Arthurs '167 discloses a star coupler (20 of fig. 10) comprising an optical splitter (col. 4, lines 50-56) to split a multiple wavelength signal into a substantially similar set of wavelengths (col. 4, lines 50-56). Arthurs '167 does not expressly disclose that the star coupler comprises a wavelength division multiplexer (WDM). However, although Arthurs '167 does not include a comprehensive description of the star coupler, a skilled artisan would have clearly recognized that a WDM would usually reside in the star coupler 20 in order to combine the plurality of modulated output optical signals 24-N. This type of star coupler is common and widely used throughout the art. For example, Cheng, from a similar field of endeavor, teaches a wavelength division multiplexer (20 of fig. 3) coupled to at least some of

a plurality of integrated modules (16 of fig. 3) and coupled to an optical splitter (50 of fig. 3), the wavelength division multiplexer operable to combine the modulated output optical signal and at least another of the plurality of optical signal wavelengths into a multiple wavelength output optical signal for communication to the optical splitter (WDM 20 combines channels 1-N for communication to splitter 50), wherein the optical splitter comprises a power splitter that separates the multiple wavelength output optical signal into a plurality of multiple wavelength output optical signals (splitter 50 splits the WDM signal into a plurality of signals 54), each of the plurality of output optical signals comprising a substantially similar set of wavelengths (see col. 5, lines 8-12). It would have been obvious to a skilled artisan at the time of invention to include a WDM, such as the one taught by Cheung, in the star coupler of Arthurs '167 in order to combine the output signals λ_1-λ_N so as to properly split the multiple wavelength signal into a substantially similar set of wavelengths.

Regarding claim 7, in view of the 112 rejection above, the combined invention of Arthurs '167 and Cheung teaches an optical signal separator operable to receive a multiple wavelength optical input signal (50 of fig. 3 of Cheung) and to separate that signal into a plurality of optical input wavelength signals (separates signal into a plurality of signals).

Regarding claim 11, the combined invention of Arthurs '167 and Cheung does not expressly disclose that the signal separator is an arrayed waveguide grating. However, examiner takes official notice that it is well known to use an arrayed waveguide grating to obtain a desired signal. It would have been obvious to a skilled artisan at the time of invention to use an arrayed waveguide grating in order to effectively retrieve the desired wavelength in a cost-efficient way.

Regarding claim 8, Arthurs '167 teaches that at least one of the plurality of optical input signal wavelengths comprises a packet comprising an identifier associated with a element external to the optical communication device (see fig. 3).

Regarding claim 13, Arthurs '167 teaches that the transmitter includes at least one light source selected from the group consisting of fixed wavelength lasers and tunable lasers (22-N of fig. 10).

Regarding claim 14, Arthurs '167 teaches that the transmitter includes at least one light source selected from the group consisting of laser diodes and light emitting diodes (22 of fig. 8).

Regarding claim 17, Arthurs '167 teaches that the optical communication device comprises a router (fig. 10).

Regarding claim 49, Arthurs '167 teaches the limitations of claim 1 but does not expressly disclose an optical amplifier to amplify the signal wavelengths. Examiner takes official notice that using an amplifier to amplify optical signals is well known in the art. It would have been obvious to a skilled artisan at the time of invention to include an optical amplifier in the system of Arthurs '167 in order to boost signal levels.

Regarding claim 52, Arthurs '167 teaches that the splitter separates the multiple wavelength output optical signal into sixteen or more outgoing signals (fig. 1: the signals can be split into a plurality of signals along fiber lines 27-1 to 27-N).

Regarding claim 53, Arthurs '167 teaches a communication link comprising one or more single mode optical fibers (col. 2, line 50).

Regarding claim 55, Arthurs '167 teaches that the scheduling algorithm comprises a round robin scheduling algorithm (the scheduling algorithm 30 of fig. 10 is considered "round

robin" in that it uses a token format traveling around the network; see also col. 5, line 43 to col. 6, line 7).

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Cheung and in further view of Dantu et al. (US Patent No. 6,532,088).

Regarding claim 9, the combined invention of Arthurs '167 and Cheung teaches the limitations of claim 8 but does not expressly disclose that the packet comprises an IP or TCP packet. However, the use of the use of TCP in an optical packet switching system is well known and widely used in the art. For example, Dantu teaches an optical transmission system using packets comprising TCP/IP to transmit signals over a network (col. 1, line 66 - col. 2, line 8). A skilled artisan would have been motivated to implement TCP in a system for multiple reasons. With TCP, end-to-end virtual connections, which set parameters for transferring data without assigning physical network channels, are established between subscribers. With this type of operation, TCP is implemented in the end stations, but not seen by the network itself. This allocation of functions simplifies processing within the network and facilitates interfacing between heterogeneous networks. Furthermore, other advantages associated with TCP include the ability to have variable size packets, less operating systems interrupts, fast routing for data calls, and error control for efficient and accurate transmission. It would have been obvious to a skilled artisan at the time of invention to implement TCP in the system of Arthurs '167 in order to take advantage of the benefits above so as to improve overall system performance.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Cheung and in further view of O'Connor (US Pub. No. 2002/0085543 A1).

Regarding claim 10, the combined invention of Arthurs '167 and Cheung teaches the limitations of claim 8 but does not expressly disclose that the packet comprises an MPLS packet. However, MPLS is an advanced routing technique well known in the art. For example, O'Connor teaches an advanced IP/SONET system wherein regular packets are converted into an MPLS format at edge nodes (paragraph 0008). A skilled artisan would have been motivated to use MPLS packets in order to reduce the amount of state information that needs to be maintained by a network, to determine the physical path through a network, to identify the quality of service requirements of paths through the network and to provide multiple paths through access networks. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use MPLS packets as taught by O'Connor in the transmission system of Arthurs '167.

Claims 50 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Cheung and in further view of Okayama et al. (US Patent No. 5,636,045).

Regarding claims 50 and 51, Arthurs '167 teaches the limitations of claim 1, but does not expressly disclose that the signals are time division multiplexed. However, time division multiplexing is well known in the art. For example, Okayama discloses a packet switching system wherein signals are time division multiplexed by a star coupler (col. 1, lines 31-34). It would have been obvious to a skilled artisan at the time of invention to time division multiplex the signals in order to efficiently utilize bandwidth.

Claims 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Labriola, II (US Patent No. 5,428,470).

Regarding claim 54, Arthurs '167 teaches the limitations of claim 1 including the limitation of a control network (30 of fig. 9). Arthurs '167 does not specifically disclose that the control network comprises an Ethernet network. However, Ethernet networks are well known in the art. For example, Labriola teaches a network system utilizing Ethernet links (col. 3, lines 44-47). One of ordinary skill in the art would have been motivated to use Ethernet links for coupling in order to provide high speed and efficient operation. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use Ethernet in the control network of Arthurs '167.

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '681 in view of Cheung.

Regarding claim 1, Arthurs '681 teaches an optical communication device, comprising: a plurality of integrated modules operable to transmit and receive a plurality of optical signal wavelengths (16-N of fig. 1), at least one of the plurality of integrated modules comprising: one or more transmitters (45-N of fig. 1) each operable to generate at least one of the plurality of optical signals and to modulate information onto the at least one of the plurality of optical signals to form a modulated optical output signal (along 24-N of fig. 1), each modulated optical output signal comprising a first optical signal wavelength; and one or more receivers each operable to receive an input optical signal (51-N of fig. 1), each input optical signal comprising a second

optical signal wavelength, wherein each first optical signal wavelength is different than each second optical signal wavelength (col. 4, lines 55-60: the wavelength received by 51-N is unique); a star coupler (22 of fig. 1) comprising an optical splitter (see col. 4, lines 13-15), operable to separate and distribute output optical signals (along fiber trunks 26-N), wherein each of the plurality of output optical signals comprising a substantially similar set of wavelengths (see col. 4, lines 13-15); and a controller coupled to at least some of the plurality of integrated modules (40 of fig. 1; see also fig. 2), the controller operable to generate a control signal (47 of fig. 1) based at least in part on a scheduling algorithm (e.g., see figs. 5A and 5B) and to communicate the control signal to the at least some of the plurality of integrated modules (along fiber trunks), wherein the at least some of the plurality of integrated modules use the control signal to reduce contention between the plurality of integrated modules (see Abstract). Arthurs '681 does not expressly disclose that the star coupler comprises a wavelength division multiplexer (WDM). However, although Arthurs '681 does not include a comprehensive description of the star coupler, a skilled artisan would have clearly recognized that a WDM would usually reside in the star coupler in order to combine the plurality of modulated output optical signals. This type of star coupler is common and widely used throughout the art. For example, Cheng, from a similar field of endeavor, teaches a wavelength division multiplexer (20 of fig. 3) coupled to at least some of a plurality of integrated modules (16 of fig. 3) and coupled to an optical splitter (50 of fig. 3), the wavelength division multiplexer operable to combine the modulated output optical signal and at least another of the plurality of optical signal wavelengths into a multiple wavelength output optical signal for communication to the optical splitter (WDM 20 combines channels 1-N for communication to splitter 50), wherein the optical splitter

comprises a power splitter that separates the multiple wavelength output optical signal into a plurality of multiple wavelength output optical signals (splitter 50 splits the WDM signal into a plurality of signals 54), each of the plurality of output optical signals comprising a substantially similar set of wavelengths (see col. 5, lines 8-12). It would have been obvious to a skilled artisan at the time of invention to include a WDM, such as the one taught by Cheung, in the star coupler of Arthurs '681 in order to combine the output signals so as to properly split the multiple wavelength signal into a substantially similar set of wavelengths.

Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '681 in view of Cheung and in further view of Arthurs '167.

Regarding claim 48, the combined invention of Arthurs '681 and Cheung teaches the limitations of claim 1, but does not expressly disclose a filter to separate the input optical signal from a multiple wavelength signal received by the integrated module, wherein the filter separates the input optical signal based at least in part on the control signal generated by the controller. However, a skilled artisan would have recognized that some kind of signal separation or filtering function would have been needed since the transport star coupler (32 of fig. 1) distributes a multiple wavelength signal to the integrated module (12-N of fig. 1). It is well known in the art to detect a specific wavelength from a multiple wavelength signal using a signal separator or filter. For example, Arthurs '167 , from a similar field of endeavor, discloses an integrated module receiving a multiple wavelength signal (27 of fig. 9) and using a filter to separate the input optical signal from the multiple wavelength signal (26 of fig. 9). The filter separates the input optical signal based at least in part on the control signal generated by the controller (28 of

fig. 9). It would have been obvious to a skilled artisan at the time of invention to incorporate the filter of Arthurs '167 in the system of Arthurs '681 in order to receive the desired wavelength.

Claims 18, 24, 27, 33-35, 56-58, 61, 62, and 64-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '681 in view of Arthurs '167.

Regarding claims 18 and 56, in view of the 112 rejection above, Arthurs '681 teaches an optical communication device, comprising: a plurality of integrated modules (16-N of fig. 1) operable to communicate a multiple wavelength output signal, each of the plurality of integrated modules operable to receive at least some of a plurality of optical signal wavelengths (36-N of fig. 1) and to generate at least one wavelength of a multiple wavelength output optical signal (transmitted along 24-N of fig. 1), each of the plurality of integrated modules comprising: a receiver operable to receive an input optical signal from the plurality of optical signal wavelengths and to convert at least a portion of the input optical signal into an electronic signal (51-N of fig. 1); and an optical transmitter (45-N of fig. 1) operable to generate an optical signal and to modulate information onto the optical signal to form a modulated optical output signal (transmitted along 24-N of fig. 1), the modulated optical output signal comprising an optical signal wavelength that is different than an optical signal wavelength of the input optical signal (col. 4, lines 55-60: the wavelength received by 51-N is unique); an optical splitter coupled to at least some of the plurality of integrated modules (20 of fig. 1; see col. 4, lines 13-15), wherein the optical splitter comprises a power splitter operable to receive at lease some of the multiple wavelength output optical signal and to separate the multiple wavelength output optical signal into a plurality of multiple wavelength output optical signals (transmitted along fiber trunks 26-N

of fig. 1), each of the plurality of output optical signals comprising a substantially similar set of wavelengths (see col. 4, lines 13-15); and a controller coupled to at least some of the plurality of integrated modules (40 of fig. 1), the controller operable to generate a control signal (47 of fig. 1) based at least in part on a scheduling algorithm (e.g., see figs. 5A and 5N) and to communicate the control signal to the at least some of the plurality of integrated modules (along fiber trunks), wherein the at least some of the plurality of integrated modules use the control signal to reduce contention between the plurality of integrated modules (see Abstract). Arthurs '681 does not expressly disclose an optical signal separator operable to separate the input optical signal from the plurality of optical signal wavelengths. However, a skilled artisan would have recognized that some kind of signal separation or filtering function would have been needed since the transport star coupler (32 of fig. 1) distributes a multiple wavelength signal to the integrated module (12-N of fig. 1). It is well known in the art to detect a specific wavelength from a multiple wavelength signal using a signal separator or filter. For example, Arthurs '167 , from a similar field of endeavor, discloses an integrated module receiving a multiple wavelength signal (27 of fig. 9) and using a filter to separate the input optical signal from the multiple wavelength signal (26 of fig. 9). The filter separates the input optical signal based at least in part on the control signal generated by the controller (28 of fig. 9). It would have been obvious to a skilled artisan at the time of invention to incorporate the filter of Arthurs '167 in the system of Arthurs '681 in order to receive the desired wavelength.

Regarding claim 24, Arthurs '681 teaches that the signal wavelengths comprises a packet comprising an identifier associated with a destination element external to the optical communication system (see col. 1, lines 50-55).

Regarding claim 27, the combined invention of Arthurs '681 and Arthurs '167 teaches the limitations of claim 18 but does not specifically disclose that the separator is a device selected from the group consisting of a wavelength division demultiplexer, a waveguide grating router, and an arrayed waveguide grating. However, examiner takes official notice that it is well known to use an arrayed waveguide grating to obtain a desired signal. It would have been obvious to a skilled artisan at the time of invention to use an arrayed waveguide grating in order to effectively retrieve the desired wavelength in a cost-efficient way.

Regarding claim 33, Arthurs '681 teaches that the optical transmitter comprises a light source operable to generate at a specified wavelength, and wherein the light source is selected from the group consisting of fixed wavelength lasers and tunable lasers (45-N of fig. 1).

Regarding claim 34, Arthurs '681 teaches that the optical transmitter comprises a light source operable to generate at a specified wavelength, and wherein the light source is selected from the group consisting of laser diodes and light emitting diodes (col. 5, lines 27-28).

Regarding claim 35, in view of the 112 rejection above, Arthurs '681 teaches a combiner operable to receive each of the optical output wavelength signals and to generate a multiple wavelength output optical signal (star coupler 22 of fig. 1 combines the signals along fiber trunks 24-N).

Regarding claim 57, Arthurs '681 discloses the limitations of claim 18, but does not disclose that the integrated module comprises a plurality of optical transmitters. Instead, Arthurs '681 uses a single tunable optical transmitter to transmit at multiple desired wavelengths. However, official notice is taken that it is well known to use a plurality of optical transmitters to transmit at multiple desired wavelengths. A skilled artisan would have been motivated to use a

plurality of optical transmitters instead of a single tunable transmitter in order to have a simpler system for easier maintenance. It would have been obvious to a skilled artisan at the time of invention to use a plurality of optical transmitters in order to transmit at multiple desired wavelengths.

Regarding claim 58, Arthurs '681 teaches the limitations of claim 36 but does not expressly disclose an optical amplifier to amplify the signal wavelengths. Examiner takes official notice that using an amplifier to amplify optical signals is well known in the art. It would have been obvious to a skilled artisan at the time of invention to include an optical amplifier in the system of Arthurs '681 in order to boost signal levels.

Regarding claim 61, Arthurs '681 teaches that the splitter separates the multiple wavelength output optical signal into sixteen or more outgoing signals (fig. 1: the signals can be split into a plurality of signals along fiber lines 26-1 to 26-N).

Regarding claim 62, Arthurs '681 teaches a communication link comprising one or more single mode optical fibers (network 20 of fig. 1 comprises single mode fibers).

Regarding claim 64, Arthurs '681 teaches that the scheduling algorithm comprises a round robin scheduling algorithm (the scheduling algorithm used by the controller is considered to be "round robin"; see also fig. 2).

Regarding claim 65, Arthurs '681 discloses the limitations of claim 18, but does not disclose that the integrated module comprises a plurality of optical receivers. Instead, Arthurs '681 uses a single tunable optical receiver to receive signals at multiple desired wavelengths. However, official notice is taken that it is well known to use a plurality of optical receivers to receive signals at multiple desired wavelengths. A skilled artisan would have been motivated to

use a plurality of optical receivers instead of a single tunable receiver in order to have a simpler system for easier maintenance. It would have been obvious to a skilled artisan at the time of invention to use a plurality of optical receivers in order to receive signals at multiple desired wavelengths.

Regarding claim 66, the combined invention of Arthurs '681 and Arthurs '167 teaches the limitations of claim 35 but does not expressly disclose that the combiner is a power combiner. However, examiner takes official notice that power combiners are well known in the art. It would have been obvious to a skilled artisan at the time of invention to use a power combiner in order to efficiently combine signals for proper distribution.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '681 in view of Arthurs '167 and in further view of Dantu et al. (US Patent No. 6,532,088).

Regarding claim 25, the combined invention of Arthurs '681 and Arthurs '167 teaches the limitations of claim 24 but does not expressly disclose that the packet comprises an IP or TCP packet. However, the use of the use of TCP in an optical packet switching system is well known and widely used in the art. For example, Dantu teaches an optical transmission system using packets comprising TCP/IP to transmit signals over a network (col. 1, line 66 - col. 2, line 8). A skilled artisan would have been motivated to implement TCP in a system for multiple reasons. With TCP, end-to-end virtual connections, which set parameters for transferring data without assigning physical network channels, are established between subscribers. With this type of operation, TCP is implemented in the end stations, but not seen by the network itself. This allocation of functions simplifies processing within the network and facilitates interfacing

between heterogeneous networks. Furthermore, other advantages associated with TCP include the ability to have variable size packets, less operating systems interrupts, fast routing for data calls, and error control for efficient and accurate transmission. It would have been obvious to a skilled artisan at the time of invention to implement TCP in the system of Arthurs '681 in order to take advantage of the benefits above so as to improve overall system performance.

Claims 59 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '681 in view of Arthurs '167 and in further view of Okayama et al. (US Patent No. 5,636,045).

Regarding claims 59 and 60, the combined invention of Arthurs '681 and Arthurs '167 teaches the limitations of claim 18, but does not expressly disclose that the signals are time division multiplexed. However, time division multiplexing is well known in the art. For example, Okayama discloses a packet switching system wherein signals are time division multiplexed by a star coupler (col. 1, lines 31-34). It would have been obvious to a skilled artisan at the time of invention to time division multiplex the signals in order to efficiently utilize bandwidth.

Claims 63 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '681 in view of Arthurs '167 and in further view of Labriola, II (US Patent No. 5,428,470).

Regarding claim 63, the combined invention of Arthurs '681 and Arthurs '167 teaches the limitations of claim 18 including the limitation of a control network (30 of fig. 9). Arthurs '681 does not specifically disclose that the control network comprises an Ethernet network. However, Ethernet networks are well known in the art. For example, Labriola teaches a network

system utilizing Ethernet links (col. 3, lines 44-47). One of ordinary skill in the art would have been motivated to use Ethernet links for coupling in order to provide high speed and efficient operation. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use Ethernet in the control network of Arthurs '681.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Lee whose telephone number is (571) 272-2220. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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